



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
23.07.2014 Bulletin 2014/30

(51) Int Cl.:
H01M 4/131 (2010.01) **H01M 4/485** (2010.01)
H01M 4/505 (2010.01) **H01M 4/58** (2010.01)
H01M 10/052 (2010.01) **H01M 4/36** (2006.01)
C01G 51/00 (2006.01)

(43) Date of publication A2:
24.07.2013 Bulletin 2013/30

(21) Application number: **13150537.2**

(22) Date of filing: **08.01.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

• **Robert Bosch GmbH**
70442 Stuttgart (DE)

(30) Priority: **17.01.2012 US 201261587505 P**
27.07.2012 US 201213560954

(72) Inventors:
• **Kim, Seung-Mo**
Yongin-si, Gyeonggi-do (KR)
• **Jeoung, Jun-Sik**
Yongin-si, Gyeonggi-do (KR)

(71) Applicants:
• **Samsung SDI Co., Ltd.**
Yongin-si, Gyeonggi-do (KR)

(74) Representative: **Gulde & Partner**
Patent- und Rechtsanwaltskanzlei mbB
Wallstraße 58/59
10179 Berlin (DE)

(54) **Positive active material for rechargeable lithium battery and rechargeable lithium battery including the same**

(57) The invention relates to a positive active material (10, 20) for a rechargeable lithium battery as well as to a rechargeable lithium battery including the positive active material. The material comprises:
a core (11, 21) comprising a lithium composite metal oxide selected from the group consisting of compounds represented by the following Chemical Formula 1, Chemical Formula 2, and combinations thereof,

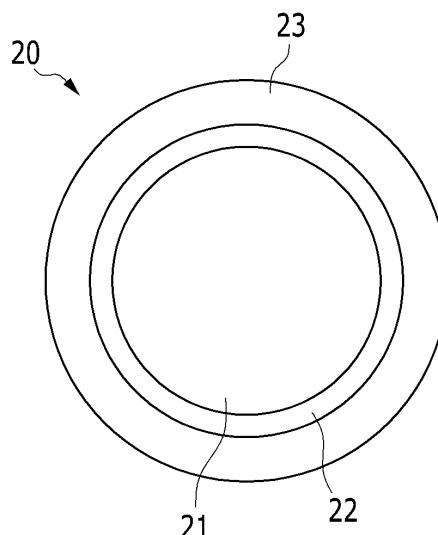


wherein M is one or more metal element, and $1 \leq x \leq 1.1$,



wherein M' is one or more metal element, $0 < y < 1$; and a shell (13, 23) covering the core (11, 21), the shell comprising lithium iron phosphate (LiFePO_4), wherein the shell (13, 23) is present in an amount in a range of 5 to 15 wt% based on the total weight of the positive active material.

FIG. 1B





EUROPEAN SEARCH REPORT

Application Number
EP 13 15 0537

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 2011/052991 A1 (KIM SEONG-BAE [KR] ET AL) 3 March 2011 (2011-03-03) * page 2, paragraph 0015-0022 * * page 2, paragraph 0028-0029 * * page 3, paragraph 0034 * * page 3, paragraph 0040 - paragraph 0042 * * page 4, paragraph 0052 - page 5, paragraph 0059 * * page 6, paragraph 0064-0071 *	1-5,8-15 6,7	INV. H01M4/131 H01M4/485 H01M4/505 H01M4/58 H01M10/052 H01M4/36 C01G51/00
X A	WO 2011/072547 A1 (SHENZHEN DYNANONIC CO LTD [CN]; KONG LINGYONG [CN]; JI XUEWEN [CN]; WA) 23 June 2011 (2011-06-23) * abstract *	1,3,6,7, 11,12,15 2,4,5, 8-10,13, 14	TECHNICAL FIELDS SEARCHED (IPC) H01M C01G
X,P A,P	& US 2012/264018 A1 (KONG LINGYONG [CN] ET AL) 18 October 2012 (2012-10-18) * page 1, paragraphs 0001, 0003, 0008-0009 *	1,3,6,7, 11,12,15 2,4,5, 8-10,13, 14	
A	WO 2011/032264 A1 (HYDRO QUEBEC [CA]; GUERFI ABDELBAST [CA]; LABRECQUE JEAN-FRANCOIS [CA]) 24 March 2011 (2011-03-24) * abstract * * page 2, line 28 - page 3, line 23 * * page 4, line 29 - page 5, line 23 *	1-15	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 June 2014	Examiner Kelly, Michael
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 15 0537

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-06-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011052991 A1	03-03-2011	NONE	
-----	-----	-----	-----
WO 2011072547 A1	23-06-2011	CN 101740752 A	16-06-2010
		US 2012264018 A1	18-10-2012
		WO 2011072547 A1	23-06-2011
-----	-----	-----	-----
WO 2011032264 A1	24-03-2011	CA 2678540 A1	15-03-2011
		CA 2772680 A1	24-03-2011
		CN 102498596 A	13-06-2012
		EP 2478580 A1	25-07-2012
		JP 2013504858 A	07-02-2013
		KR 20120080199 A	16-07-2012
		US 2012237833 A1	20-09-2012
		WO 2011032264 A1	24-03-2011
-----	-----	-----	-----

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82